

January 6, 1955

Ref: Dr. S. G. BRADLEY

Dr. C. J. Lapp
Fellowship Office
National Research Council
2101 Constitution Avenue
Washington 25, D.C.

Dear Dr. Lapp:

It is a pleasure to write to you concerning Dr. Bradley's performance on his N.R.C.-Lilly & Co. research fellowship during the past quarter. I was not well acquainted with him before, but he has so far amply justified the first favorable impressions that he made. He has gotten right down to work, quietly, methodically and industriously. His previous background was in the nutrition and developmental physiology of slime molds. This impinged upon a number of genetic problems, but that material gave little scope for perfecting skills in genetics. While here, he has been developing a problem in the genetics and life cycles of actinomycetes (*Streptomyces* spp.).

To date, he has been principally occupied with the selection and characterization of appropriate strains for the work, with the improvement of techniques for the isolation of nutritional mutants, and with the nutritional characterization of these mutants. A number of single auxotrophs have been obtained by screening with replica plating technique of colonies from ultra-violet treated spores. Preliminary crossing attempts have been made with some of these mutants, but for definitive experiments, double auxotroph parents are essential, and are being sought.

The results to date already show that the problem is provocative but not simple. Many of the mutants show pronounced syntrophic interactions which tend to obscure combinations that might have a genetic basis. The most striking result consists of prototrophic colonies which appear to be balanced heterokaryons from the mycelia of the two parents. However, as a rule, the spores from such colonies dissociate completely into the two parental types. To prove that these prototrophs are heterokaryons, it is necessary to isolate single hyphae from which both components can later be recovered, and this will require further technical development.

A few prototrophs have appeared to be somewhat more stable, but the genetic markers so far available are insufficient to tell whether these are recombinants, heterozygotes, heterokaryons or some other type of

genetic interaction -- or simply reverse mutation.

Bradley has proved a most eager student-- perhaps scholar would be a better term. He has a refreshing inquisitiveness, coupled with the most circumspect critical caution I have seen in someone of his age and imagination. This has not prevented him from doing experiments which later surprised him by being successful. On the other hand, while he has been quick to pick up the genetics milieu here, he has a great deal still to learn in this field.

In my opinion, it will take another year before his problem is likely to reach the stage that will require really subtle genetic analysis, and for this reason it would be indispensable both for his own development, and for the fruition of his research, to renew his tenure here, whether through the auspices of his present fellowship, or otherwise. For the next several months, he will probably be learning and doing with actinomycetes the sort of technique and analysis that has already been laid out with other microorganisms, e.g., *Escherichia coli*. In both a technical and conceptual sense, this would be the groundwork for what he should be building later. Two years seems like a moderate and reasonable estimate of the time needed and allowable for this kind of construction. If I am not mistaken, Dr. Bradley already made this point in his original application: at least I took the pains to make that estimate to him during our preliminary discussions.

Yours sincerely,

Joshua Lederberg
Professor of Genetics